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Safety Summary

Safety Symbols Marked on the Cardiograph

The following symbols are used on the cardiograph or the cart.

⚠	Caution - See operating instructions.
	Type CF, external defibrillation protected.
~	Alternating current.
	Equipotential (this is on the ground lug).
	The maximum weight that the cart can hold.

Please see chapter 4, "Performance Verification and Maintenance," for safety requirements that apply to the cardiograph.

Conventions Used in This Manual

Warning

Warning statements describe conditions or actions that can result in personal injury or loss of life.

Caution

Caution statements describe conditions or actions that can result in damage to the equipment or software.

Note

Notes contain additional information on cardiograph usage.

Softkey	represents the temporary key labels that appear on the display.
key	represents keys on the front panel.

Preface

This manual contains service information for the Hewlett-Packard M1700A PageWriter XLi, M1701A PageWriter XLs, and M1702A PageWriter XLe cardiographs. The information and procedures in this manual apply to all models unless otherwise specified.

This manual is organized as follows:

Chapter 1—Introduction. Contains a general description of the cardiographs, lists of technical specifications, and lists of accessories and options.

Chapter 2—Installation and Configuration. Summarizes the cardiograph installation and explains how to configure the cardiograph for specific customer requirements.

Chapter 3—Operation. Summarizes how to operate the cardiograph.

Chapter 4—Performance Verification and Maintenance. Explains how to check the cardiograph's performance using built-in self-tests, and lists maintenance procedures and safety requirements that apply to the cardiograph.

Chapter 5—Theory of Operation. Provides an overview of how the cardiograph works and describes the operation of the major subassemblies.

Chapter 6—Troubleshooting. Contains procedures and error codes to aid the service person in localizing faults to a replaceable subassembly.

Chapter 7—Removal and Replacement. Contains procedures for removing and replacing each of the cardiograph's major subassemblies.

Chapter 8—Parts List. Lists part numbers for the cardiograph's replaceable parts, and provides assembly drawings.

Appendix A—Connector Pin Assignments. Identifies and defines the signals assigned to the subassembly interconnections.

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1

Introduction

This chapter introduces you to the M1700A PageWriter XLi, M1701A PageWriter XLs, and M1702A PageWriter XLe cardiographs and lists their technical specifications.

Warning **These cardiographs are only to be serviced by qualified personnel.**

Note **Safe and effective use of medical instrumentation requires periodic inspection and preventive maintenance.** Perform the preventive maintenance procedures in Chapter 4 of this manual at required intervals to ensure satisfactory instrument performance.

The cardiographs use a thermal printhead to record waveforms and label the ECG report. The paper supplied with the cardiographs is a special thermal paper designed specifically to work with the thermal printhead and the photo detector used to advance the paper.

The cardiograph's disk drive (M1700A & M1701A only) is a critical part. Disks of substandard quality can damage the drive or destroy patient data.

Hewlett-Packard guarantees the performance of the cardiographs only when used with paper and disks that meet or exceed Hewlett-Packard specifications.

PageWriter XL Cardiographs

The M1700A PageWriter XLi is Hewlett-Packard's full-featured, interpretive cardiograph. The M1701A PageWriter XLs is the standard, non-interpretive cardiograph. The M1702A PageWriter XLe is the basic, non-interpretive cardiograph. Each cardiograph uses a patient module, which is a remote "front end" that acquires and digitizes data. The M1700A and M1701A patient modules feature a start button and an LCD display that indicates signal quality. The M1702A patient module does not feature a display or start button. The cardiograph main unit has the user controls, the disk drive (M1700A and M1701A only), the printer, and all the processing circuitry. All models use the same enclosure, except when the M1700A is equipped with preview display. The models fit onto the M1705A cart designed for these cardiographs. Figure 1-1 shows the M1700A with preview display mounted on the cart.

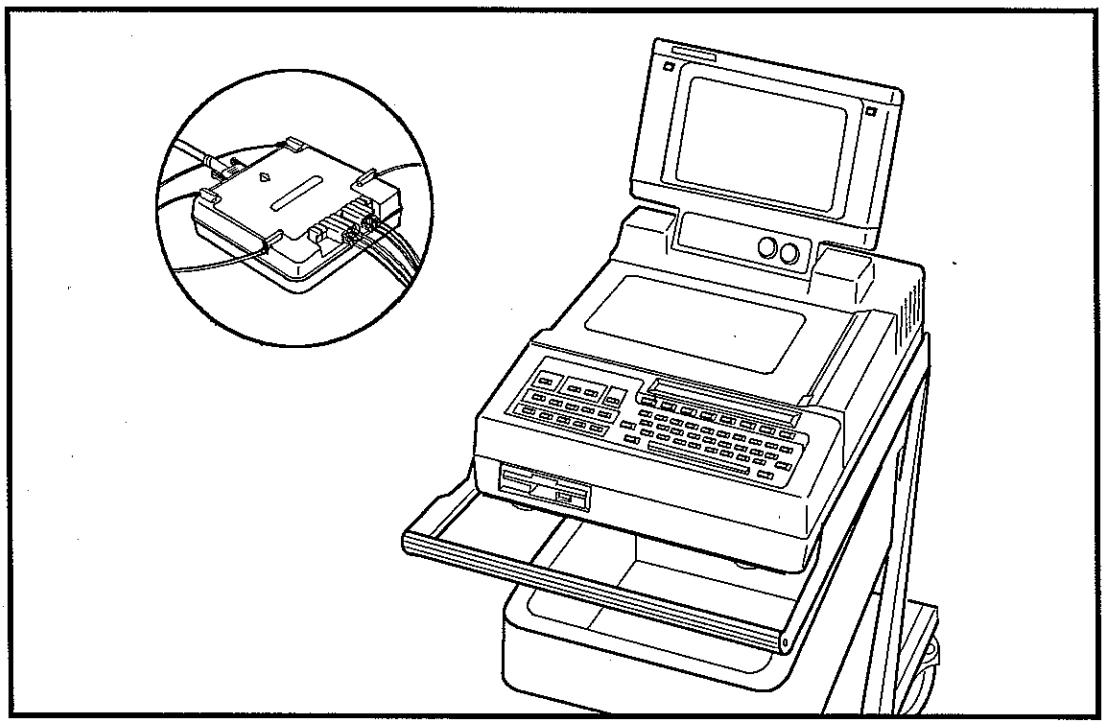


Figure 1-1. M1700A PageWriter XLi Cardiograph with Preview Display.

The PageWriter XL family of cardiographs can print ECGs in Auto and Manual formats for different clinical tests or applications. Both cardiographs print all traces with a continuous feed, high-resolution, digital array printer. This produces electrocardiograms on standard page lengths that require no cutting or mounting. Records are clearly annotated with ECG data and patient information. The M1700A also labels records with automatic ECG measurements and ECG interpretation for both adult and pediatric patients.

The M1700 and M1701A cardiographs use flexible disks for storing ECGs. Exact ECG copies can be made at the bedside or later. Each ECG is automatically logged and can be automatically stored by the cardiograph. A list of all stored ECGs can be printed, facilitating administrative reporting and billing. Typically, 50–150 ECGs can be stored per flexible disk, although the actual quantity depends on usage.

From a service standpoint, the PageWriter XL cardiographs are similar except for five major hardware differences:

- The M1700A preview display allows you to view the ECG prior to recording.
- The M1700A CPU assembly has extra memory to accommodate the measurement and interpretation software, but uses the same ROM as the M1701A.
- Each PageWriter has a unique CPU assembly.

- The M1700A and M1701A load software from, and store ECGs to, the disk drive. The M1702A software is in ROM, and does not store ECGs.
- The M1700A and M1701A patient modules feature a display that indicates signal quality and a start button. The M1702A patient module does not offer these features.

All other model differences are found in the cardiograph's software. The M1700A and M1701A software is installed in the cardiograph from flexible disk, while the M1702A software is installed from ROM. After installation, the software is stored in dynamic RAM (DRAM). Re-installation is required only when a user desires a different configuration, or if DRAM loses its contents due to a low battery.

The PageWriter XL family of cardiographs is designed for long-term reliability. The modular design makes extensive use of VLSI and gate array technology, resulting in a minimum number of major subassemblies. The modular approach means less down-time for the user, since replacing subassemblies allows quicker field repairs. The extended self-test efficiently identifies faulty subassemblies, further speeding the repair process.

Note

As of February 1992, all new PageWriter XL cardiographs are manufactured to a revised mechanical design specification. All units having a serial number prefix of 3208A or later conform to this revised specification. This manual describes all specific differences.

The following paragraphs describe some of the significant options available for the PageWriter XL cardiographs.

M1705A Cart

The M1705A Cart provides mobility for the PageWriter XL family of cardiographs. The large wheels make the cart easy to move, yet steady when in use. Slots in the cardiograph's feet and a thumbscrew secure the cardiograph to the cart rails. The tray directly below the cardiograph provides storage for acquired ECGs, the user's guide, and several flexible disks. The tray also has molded fittings that accommodate the modem in the M1706A Telecommunications Package. Storage for the power cable is built in, and other built-in cable retainers hold the patient data cable out of the way. Two compartmented trays provide storage for the patient module, spare patient electrodes and leadwires, additional thermal paper, consumable supplies, and miscellaneous items. An optional paper management tray is also available for the M1705A.

M1706A Telecommunications Package

With the addition of the M1706A Telecommunications Package, the M1700A can transmit ECGs over telephone lines to another site. The receiver at the other site can be a Hewlett-Packard ECG Management system or another M1700A. This feature is not available for the M1701A.

The M1706A Telecommunications Package consists of a Hayes® modem, a bracket that attaches the modem to the cart, a power cable that connects to the modem power outlet on the cardiograph, and data cables that connect the modem to the cardiograph and the telephone system. Local laws, regulations, and phone system standards determine the specific type of modem and accessories included and the types of cables included in the M1706A Telecommunications Package.

M1755A A.03.XX Software

This software is shipped with PageWriter XLi on a standard basis. This revision provides the PageWriter XLi with severity-only analysis, LaserJet printing option, and extended configurable transmission phone numbers. This revision includes all A.02.XX enhancements and also provides fax transmission, SAECG, and VCG capabilities. The software is shipped with all new PageWriter XLi cardiographs in late 1992.

A.02.XX Software

This software revision provides the PageWriter XLi with enhanced preview displays, interactive query, and FAA transmission. The software also gives the XLi fax transmission and SAECG capabilities. This revision is only available for support purposes.

A.01.XX Software

The original software for PageWriter XLi provides all basic features with preview display. This revision is only available for support purposes.

Inquiries

Refer any questions or comments regarding these instruments to the nearest Hewlett-Packard Sales/Service Office or to one of Hewlett-Packard's Service Dispatch Centers. They can provide you with additional information about service training, special applications, and schematics. Always identify the instrument by model number and serial number in all correspondence. Hewlett-Packard sales and service offices are listed at the end of this manual. Toll-free numbers for Service Dispatch Centers are listed in Chapter 8, "Parts List."

Specification Data

The following tables list the technical specifications for the cardiographs and the mobile cart. Specifications are the same for all models except as noted.

Table 1-1. Physical Specifications

Parameter	Specification
Dimensions (l × w × h)	
patient module	4 in × 5 in × 1.5 in (10.11 cm × 12.7 cm × 3.81 cm)
cardiograph	15.5 in × 22.25 in × 5.5 in (39.37 cm × 56.5 cm × 14 cm)
cart	33.37 in × 17.12 in × 36.0 in (84.76 cm × 43.48 cm × 91.44 cm)
Weight	
patient module	15 oz. (425.25 g) or less
cardiograph	46 lbs. (20.87 kg) or less (includes battery and preview display)
cart	38 lbs. (17.24 kg) or less
Connector life	
patient module	350 cycles (insertions)
RS-232	350 cycles (insertions)
Chemical resistance, cleaners	Withstands the following: isopropyl alcohol (except leadwires and patient data cable), mild soap and water, chlorine bleach and water (30 ml/l of water).

Table 1-2. Patient Module Specifications

Parameter	Specification
Resolution	5 μV after processing
Input impedance	25 MΩ @ 10 Hz, typically 100MΩ @ DC
Gain accuracy	±3% of input signal +10 μV
Input bias	40 nA or less for electrode wire input, less than 500 nA for Right Leg
Common mode rejection	110 dB or greater with AAMI load
Patient isolation, risk currents	10 μA RMS or less @ 240 V AC 50 Hz, or 120 V AC 60 Hz
Defibrillator protection	System recovery 5 seconds after 400 joule discharge, no damage
Crosstalk rejection	50 dB or greater with 10 mV p-p on other channels
Calibration signal	1 mV ±2% after processing
Sample rate	4 kHz
DC offset tolerance	±300 mV

Table 1-3. SAECG Patient Module Specifications

Parameter	Specification
Resolution	1.22 μV after processing in high-resolution mode 5 μV after processing in standard mode
Input impedance	25 MΩ @ 10 Hz, typically 100MΩ @ DC
Gain accuracy	±2% of input signal
Input bias	40 nA or less for electrode wire input, less than 500 nA for Right Leg
Common mode rejection	120 dB or greater with AAMI test load
Patient isolation, risk currents	10 μA RMS or less @ 240 V AC 50 Hz, or 120 V AC 60 Hz
Defibrillator protection	System recovery 5 seconds after 400 joule discharge, no damage
Crosstalk rejection	50 dB or greater with 10 mV p-p on other channels in standard mode
Calibration signal	1 mV ±2% after processing
Sample rate	8 kHz
DC offset tolerance	±55 mV

Table 1-4. ECG to Paper Specifications

Parameter	Specification
Frequency response	
Auto ECG	3 dB down at (user selectable): 0.05–150 Hz, 0.15–150 Hz, 0.5–150 Hz, 0.05–100 Hz, 0.15–100 Hz, or 0.5–100 Hz, 0.15–40 Hz, 0.5–40 Hz
Manual ECG	3 dB down at (user selectable): 0.05–40 Hz, 0.05–150 Hz, 0.5–40 Hz, 0.5–100 Hz, 0.05–100 Hz
SAECG	3 dB down at (user selectable): 25–300 Hz, 40–300 Hz, 80–300 Hz
power line	115 dB rejection at 50 or 60 Hz with less than 300 mV DC offset
ECG resolution on paper	
voltage axis	200 dots/in (8 dots/mm)
time axis	500 dots/in (20 dots/mm) at 25 mm/s and slower 250 dots/in (10 dots/mm) at 50 mm/s

Table 1-5. Power Supply and Battery Specifications

Parameter	Specification
AC line frequency	50 and 60 Hz
100 V setting	100 V AC nominal
120 V setting	120 V AC nominal
220 V setting	220 and 230 V AC nominal
240 V setting	240 V AC nominal
Battery voltage	18 V DC, 6.5 Ahr
Battery recharge time (from 70% down)	
to 90% capacity	8 hours typical
to full capacity	16 hours typical
Battery capacity, M1700A with preview	
without storage	30 ECGs (40 typical)
with storage	30 ECGs (40 typical)
continuous rhythm (Manual mode)	20 minutes (30 typical)
continuous idle	2 hours (3 typical)
Battery capacity, M1700A without preview	
without storage	50 ECGs (70 typical)
with storage	45 ECGs (60 typical)
continuous rhythm (Manual mode)	30 minutes (40 typical)
continuous idle	4 hours (6 typical)
Battery capacity, M1701A	
without storage	55 ECGs (75 typical)
with storage	50 ECGs (70 typical)
continuous rhythm (Manual mode)	30 minutes (40 typical)
continuous idle	4 hours (6 typical)
Battery capacity, M1702A	55 ECGs (75 typical)
continuous rhythm (Manual mode)	30 minutes (40 typical)
continuous idle	4 hours (6 typical)
Battery life	
AC and battery operation	Typically 24 months
battery only operation	Typically 12–18 months
Memory data retention time	
with fully charged battery	Typically 1 month
after "Low battery shutdown"	Typically 5 days
Modem power	9 V AC for Hayes® modem 9 V DC for Worldport 2496™ Fax/Data modem
Ground leakage current	
at 120 V	Less than 100 μA
at 220 V	Less than 500 μA
Dielectric withstand voltage	1.5 kV RMS across line/neutral to Earth for 1 min.

Table 1-6. Environmental Specifications

Parameter	Specification
Temperature	
operating	41°–115° F (5°–45° C)
storage	14°–122° F (-10°–50° C)
Humidity	
operating	20–80% RH, non-condensing
storage	10–85% RH, non-condensing
Pressure (altitude)	
operating	To 15,000 ft (4600 m)
storage	To 50,000 ft (15000 m)

Table 1-7. Miscellaneous Specifications

Parameter	Specification
Real time clock accuracy	
25° C	1.5 minutes per month
5°–45° C	5 minutes per month
RS-232 bit transmission rates	300, 1200, 4800, 9600, 19200 baud
Printhead life	Typically 100,000 pages

Options and Accessories

PageWriter XLi, XLs and XLe Cardiographs

These tables list the options and accessories available for PageWriter XL cardiographs.

Country Options

Each country option includes appropriate power cord, voltage, printer, patient module, and language. See Table 1-8, which shows the configuration of each country option.

ABA	North American Version
ABB	European English Version
ABC	French Canadian Version
ABD	German Version
ABE	Spanish Version
ABF	French Version
ABG	Australian Version
ABH	Dutch Version
ABK	Intercon English Version
ABM	Latin American Version
ABS	Swedish Version
ABU	U.K. Version
ABZ	Italian Version
AB4	Singapore Version
ACF	Japanese Version
ACQ	South African Version
AKM	Chinese Version
AKV	South American Version

Delete Options

D01	Delete preview display (M1700A only)
D02	Delete cart (M1700A, M1701A only; the M1702A is shipped without a cart)
D03	Delete standard AHA patient module
D04	Delete standard IEC patient module
D05	Delete analysis from the M1700A
D06	Delete analysis and preview from the M1700A

Cable Options

Cable options are applicable to the M1700A only.

J01	Direct transmission cable (24542M)
J02	ECG WorkStation adapter (92224F)

Supplies/Accessories Options

A04	Add paper tray to M1705A cart (M1705-89500)
K01	Extra leads kit (Frank, pediatric, research leads) (M1717B)
K02	9-meter patient data cable (M1720A)
K03	Extra paper (8.5×11, 1 case/1600 sheets) (M1707A)
K04	Extra A4 paper (1 case/1600 sheets) (M1709A)
K05	Dust cover (M1700-87600)
K06	Extra disposable electrodes (6 boxes each of 13943B, 1000/box; 1 set 13946A electrode adapters included)
K07	LaserJet printer cable
906	Swiss power cord

Substitute Options

S01	Substitute inch size (1/8in post) reusables
S02	Substitute metric size (4mm post) reusables

M1702A only:

S03	Substitute standard AHA patient module
S04	Substitute standard IEC patient module

Documentation Options

0B3	PageWriter XL Series Service Manual (English only) (M1700-91909)
0BP	User Training Video (VHS-NTSC) (M1700-89000)
0BQ	User Training Video (VHS-PAL) (M1700-89001)

Standard Accessories Supplied

- 2.5-meter patient data cable—M1719A
- 200 sheets z-fold paper—A size: M1707A; A4 size: M1709A
- 10 universal adapters—13946A
- 300 solid gel tab electrodes—13943B
- Disposable electrodes and adapters are standard supplies. Use S01 and S02 options to obtain reusables.

S01:

- 6 Welsh bulb electrodes—40421A (1/8in post)
- 4 limb electrodes—40424A (1/8in post)
- 4 limb straps—14030A
- 1 tube Redux® creme—651-1021-050

S02:

- 6 Welsh bulb electrodes—40490E (4mm banana)
- 4 limb electrodes—40491E (4mm banana)
- 4 limb straps—14030A

- 1 tube Redux® creme—651-1021-050

- *PageWriter XLi Operating Guide* (M1700A only)
- *PageWriter XLi Cardiograph User's Reference Guide* (M1700A only)
- *PageWriter XLi Cardiograph Physician's Guide* (M1700A only)
- *PageWriter XLs User's Guide* (M1701A only)
- *PageWriter XLe User's Guide* (M1702A only)
- *Signal Averaged ECG User's Guide* (M1754A only)
- *Vectorcardiography (VCG) User's Reference Guide* (M1790A only)
- Two blank, 1.44-Mb high-density disks (reorder M1700-89004, box of 10 disks)
- System software version A.03.XX (M1755A)—M1700-17720 (M1700 only)
- System software version A.01.01 (M1701A)—M1701-17700 (M1701 only)
- D06 system software version A.01.01 (M1700A)—M1700-17711 (M1700A option D05 and D06 only)

M1703A PageWriter XLi Upgrade Kits

Options

A01	Add Preview Display

M1704A PageWriter XLs Upgrade Kits

Country option must also be ordered.

Options

A01	Upgrade XLs to XLi

M1706A Telecommunications Package

M1706A includes bracket and cable. Country option must also be ordered.

Options

ABA	U.S. Modem (Hayes® 2400)
ABC	Canada Modem (Hayes® 2400)
ABE	Spain Modem (Hayes® 1200)
ABF	France Modem (Hayes® 2400)
ABH	Netherlands Modem (Hayes® 1200)
ABU	U.K. Modem (Hayes® 2400)

ABZ	Italy Modem (Hayes® 1200)
K01	Quick Connect cables for Hayes® modem (M1706-61636 and M1706-61637)

M1753A PageWriter XLe Upgrade Kit

Country option must also be ordered.

Options

A01	Upgrade XLe to XLs

M1754A PageWriter XLi Signal Averaged ECG System

Includes M1754-17700 A.01.00 SAECG software set, SAECG patient module, and operator's guide. Country option must also be ordered.

Note

The M1754A option requires the M1755A (A.02.XX, A.03.0X or higher) software. The M1754A option will not function with A.03.1X software.

Documentation Options

0BP	SAECG User Training Video VHS/NTSC (M1754-89504)
0BQ	SAECG User Training Video VHS/PAL (M1754-89505)

M1755A PageWriter XLi Upgrade Kit

Upgrade to version A.03.XX operating software. Includes two system disks and two blank disks. Specify country option.

Note

This software revision is the standard software that ships with all XLi cardiographs as of late 1992.

M1756A PageWriter XLi Direct Digital ECG Fax Modems

Includes M1756-07300 fax modem bracket and M1756-61600 fax modem cable.

Note

The M1756A option requires the M1755A (A.02.XX or higher) software.

Options

ABA	U.S. fax modem (Worldport® 2400) (M1756-89501)
ABC	Canada fax modem (Worldport® 2400) (M1756-89502)
ABD	Germany fax modem (Worldport® 1200) (M1756-89507)

ABF	France fax modem (Worldport® 2400) (M1756-89503)
ABH	Netherlands fax modem (Worldport® 1200) (M1756-89504)
ABU	U.K. fax modem (Worldport® 2400) (M1756-89505)
ABX	Italy fax modem (Worldport® 1200) (M1756-89506)
K01	Quick Connect cables for fax modem (M1756-61601 and M1706-61636)

M1788A Extra Patient Module

Includes patient module, lead set, and disposable electrodes kit.

Options

A01	Standard AHA patient module
A02	Low cost AHA patient module
A03	Standard IEC patient module
A04	Low cost IEC patient module

Substitute Options

S01	Substitute inch size (1/8in post) reusables
S02	Substitute metric size (4mm post) reusables

M1790A PageWriter XLi Vectorcardiography

Includes M1790-17700 A.01.00 VCG software set, VCG leadwires, and manuals. Country option must also be ordered. The part number for replacement leadwires is M1717B.

Note

The M1790A option requires the M1755A (A.03.1X) software version. The M1790A option will not function with the A.03.0X software.

Country Option Configurations

The following table gives the configuration of each country option.

Table 1-8. Country Option Configurations

Option	Country	Labels	Manuals	Printer	AHA/IEC	Volts	Power Cord
ABA	North American	English	English	A	AHA	120	US
ABB	European English	English	English	A4	IEC	220	Europe
ABC	French Canadian	French	French	A	AHA	120	US
ABD	German	German	German	A4	IEC	220	Europe
ABE	Spanish	Spanish	Spanish	A4	IEC	220	Europe
ABF	French	French	French	A4	IEC	220	Europe
ABG	Australian	English	English	A4	AHA	240	Australia
ABH	Dutch	Dutch	Dutch	A4	IEC	220	Europe
ABK	Intercon English	English	English	A	AHA	220	Europe
ABM	Latin American	Spanish	Spanish	A	AHA	120	US
ABS	Swedish	Swedish	Swedish	A4	IEC	220	Europe
ABU	United Kingdom	English	English	A4	IEC	240	UK
ABZ	Italian	Italian	Italian	A4	IEC	220	Europe
AB4	Singapore	English	English	A4	AHA	240	UK
ACF	Japanese	English	English	A4	IEC	100	US
ACQ	South African	English	English	A4	IEC	220	SA
AKM	Chinese	English	English	A4	IEC	220	Australia
AKV	South American	Spanish	Spanish	A	AHA	220	Europe

Note

In Table 1-8 an "A" in the **Printer** column refers to 8.5 × 11-in paper; "A4" refers to 210 × 297-mm paper.

2

Installation and Configuration

This chapter describes how to install and configure the PageWriter XL M1700A, M1701A, and M1702A cardiographs. This information provides you with a factory-recommended process to use when assisting customers. The configuration information guides you through the configuration menu structure, and describes the configuration choices.

Installation

The cardiograph is ready for operation when the following tasks have been properly performed:

- Patient data cable connected.
- Patient electrodes and leadwires installed on patient module.
- Voltage setting and fuse checked.
- Battery installed.
- Software installed (M1701A & M1700A only).
- Language and line frequency chosen.
- Paper installed.
- Clock set (time and date).
- Configuration parameters chosen.
- Configuration saved to disk (M1701A & M1700A only).

In addition to these tasks, the cardiograph should be mounted on the cart if you are using a cart, and the modem attached to the cart if you are using a modem.

Installing the Cardiograph and Modems on the Cart

To install the cardiograph on the cart:

1. Set the cardiograph on the top rails so that the cardiograph's rear feet drop into the notches on the horizontal rail edges. The operator panel must face the cart handle.
2. Slide the cardiograph away from the handle, making sure that the slots on the feet engage the rail edges.
3. Lock the cardiograph in place by installing the locking screw. The locking screw passes through the hole in the left cart rail and screws into the threaded hole on the left underside of the cardiograph.

Attach the Hayes® modem to the cart as shown in Figure 2-1:

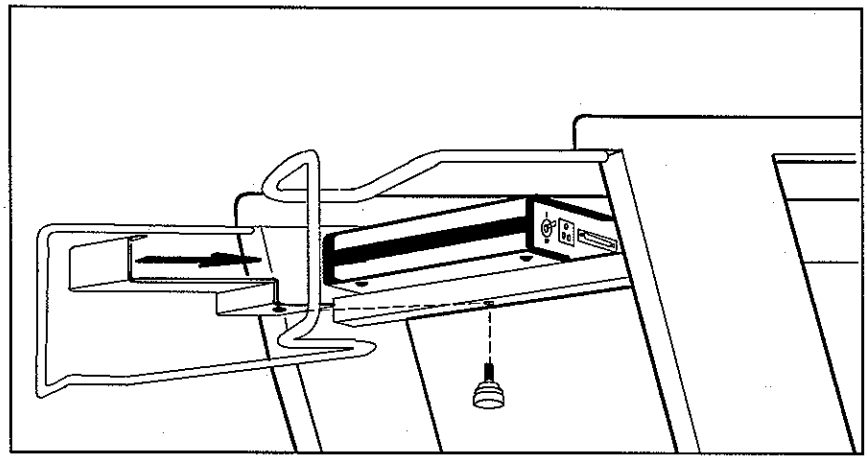


Figure 2-1. Installing the Hayes® Modem.

Installing the M1756A Fax Modem

To install the fax modem, perform the following steps (see Figure 2-2):

1. Press the On-Standby switch to turn the cardiograph to **Standby**.
2. Turn the cardiograph AC switch off.
3. Insert the larger connector end of the fax/modem cable (M1752-61600) into the RS-232C plug on the fax/modem, as shown in Figure 2-2.
4. Place the fax/modem flat into the bracket so that its data cable is retained by the two upright tabs at the narrow end of the bracket. The battery compartment should be accessible through the cutout at the wide end of the bracket.

Note

A 9-volt battery is not essential for fax/modem operation.

5. From the rear of the cart, with the data cable away from you, pass the modem under the horizontal square bar.

6. Pull the modem towards you, so that the clip on the bracket is securely over the horizontal bar.
7. Align the hole in the bracket with the tapped hole on the underside of the bar and secure the modem with the knurled screw.
8. Bring the fax/modem cables up over the square bar and insert the smaller end of the faxmodem cable into the plug on the back of the cardiograph marked `Data Comm`. Tighten the retaining screws.
9. Plug the round end of the fax modem cable into the cardiograph's modem power connector. Secure the retaining screws.
10. Insert the telephone cable into either phone connector on the side of the fax modem.

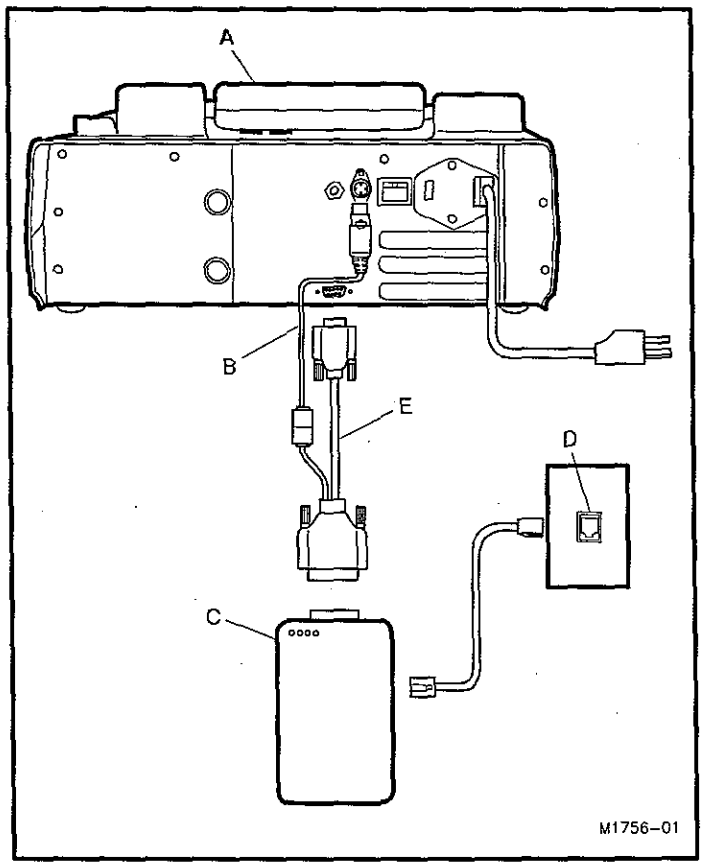


Figure 2-2. Connecting the Fax Modem Cables.

A. PageWriter XLi Cardiograph
B. Fax Modem Power Cable
C. Fax Modem
D. Phone Line Connector
E. Fax Modem Data Cable

Note For modem cabling variations see Chapter 8, Parts Lists.

Printing an ECG on an HP LaserJet Printer

You can print stored ECGs on an HP PCL5 LaserJet printer. Figure 2-3 shows how to connect the cables between the cardiograph and the printer.

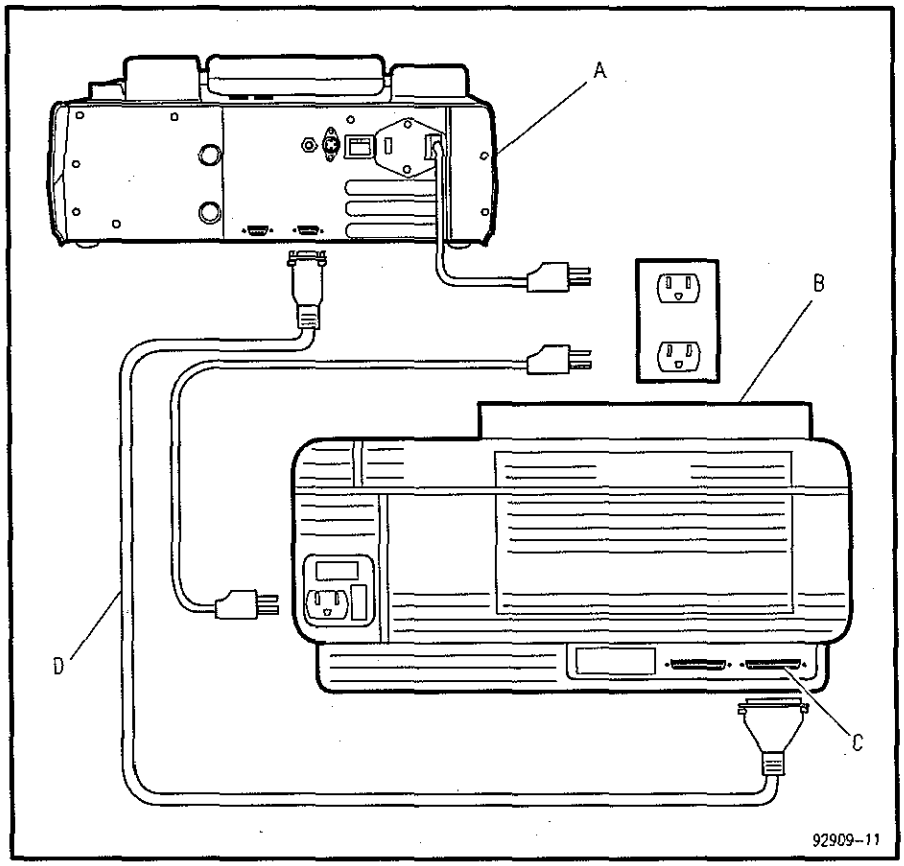


Figure 2-3. Connecting the Printer Cable.

A. PageWriter XLi Cardiograph
B. LaserJet Cable (HP 24542G)
C. HP LaserJet Printer Serial Interface Port

Setting up the LaserJet Printer

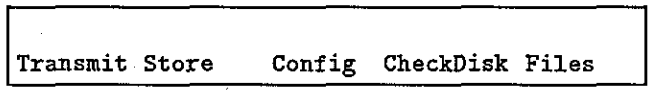
You must set up the LaserJet printer for serial printing before using it to print stored ECGs from the cardiograph. To configure the printer for serial printing, perform the following steps.

1. With the printer on, press the ON LINE key until the light is off.
2. Press the MENU key on the printer to step through the settings until `I/O=PARALLEL* appears.`
   `If I/O=SERIAL*` appears, the printer is already set for serial printing.
3. Press the + key until `I/O=SERIAL` appears.
4. Press the ENTER key on the printer. An asterisk will apear on the display: `I/O=SERIAL*`.
5. Press the MENU key and the BAUDRATE setting will appear.
6. Press the + key until `BAUDRATE=19200` appears.
7. Press the ENTER key on the printer. An asterisk will apear on the display: `BAUDRATE=19200*`.
8. Press the ON LINE key.
   The printer is ready to use with your cardiograph.

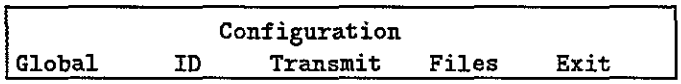
Configuring the Cardiograph to Print ECGs on the HP LaserJet

After connecting the cables, you must configure the cardiograph for printing on the HP LaserJet.

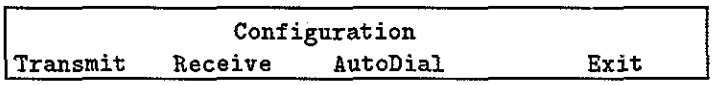
1. Press Menu until the following display appears:



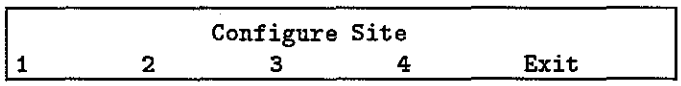
2. Press Config. The main configuration menu will appear:



3. Press Transmit and the Transmit Configuration menu appears in the display.



4. Press Transmit to configure any of four transmission sites. The Configure Site menu will appear:



5. Select a site number and the following display appears.

6. Press Choose until you see the choice LaserJet, then press Enter. The baud rate display will appear.
7. Press Choose until you see the baud rate 19200, then press Enter.
8. Select whether to print a grid.
   If you have unlined paper in the printer, this selection will print the grid with the ECG.

Your cardiograph is now set up to print to an HP LaserJet when you select the configured site from the Transmit menu. See the *PageWriter XLi Operating Guide* for information about transmitting ECGs.

Connecting the Patient Module

1. Connect the patient data cable to the ECG input jack on the back of the cardiograph.
2. Connect the other end of the patient data cable to the patient module as shown in Figure 2-4.
3. Connect the leadwires to the patient module. Match the color coding on the leadwires to the color coding on the patient module. (M1702A only: Match the labels on the leadwires to the labels on the patient module.)
4. Install shorting plugs in the patient module in those positions without leadwires.

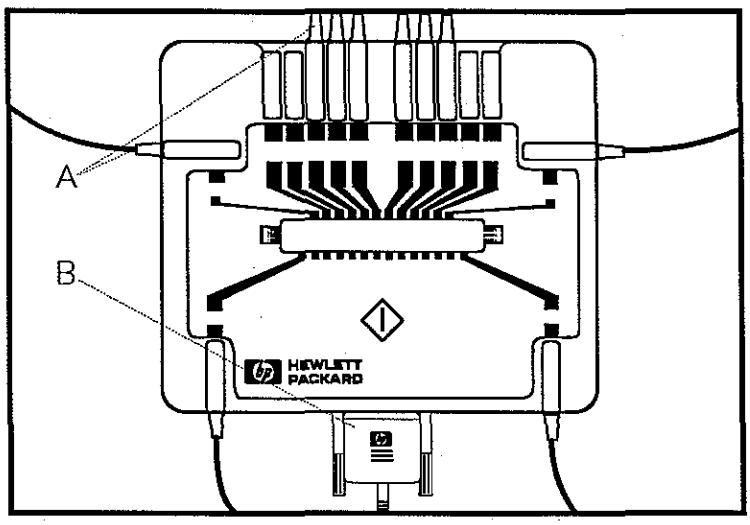


Figure 2-4. Connecting the Patient Module.

A. Leadwires

B. Patient Data Cable

Note

The M1702A patient module does not feature a signal quality display or a start button.

Note

The M1754A SAECG patient module can acquire both SAECG and standard ECGs. To get the best results for SAECG, remove the LL and LA leadwires and install shorting plugs in the LL and LA inputs.

Changing the Line Voltage Setting

The cardiograph can be set to operate at nominal line voltages of 100, 120, 220, 230, or 240 Volts. It was set at the factory to the line voltage in your area. Nevertheless, it is a good idea to check the setting, especially if the cardiograph was brought from an area with a different line voltage.

Caution

The cardiograph can be damaged if plugged into the incorrect voltage or if fused incorrectly.

The voltage setting appears in the line module window. The line module is located on the rear panel immediately to the right of the AC switch (see Figure 2-5). If the voltage setting is incorrect, change it to the correct setting for your area using the procedure that follows. If you need to change the voltage setting, be sure to also check the line fuses.

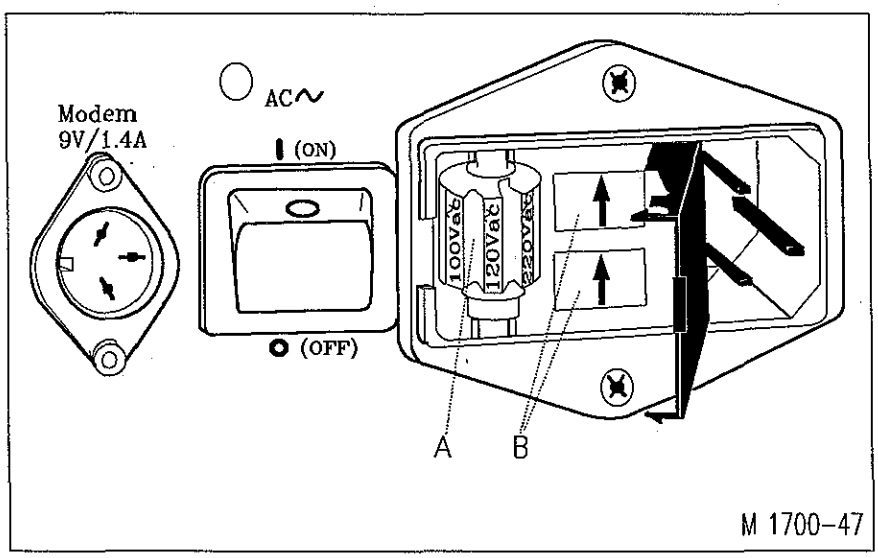


Figure 2-5. The Line Module and AC Switch.

A. Voltage selection drum

B. Fuse holders

To change the voltage setting:

1. Unplug the power cord from the line module.
2. Open the line module door with a small bit screwdriver.
3. **Remove** the voltage selector drum from the line module. The voltage selections (marked on the selector drum) are 100, 120, 220, or 240.

Caution

Do not rotate the voltage selector drum while it is installed. Doing so will damage the drum and the line module assembly.

4. Rotate the drum so that the correct voltage will appear in the window when the line module door is closed, then reinstall the drum. Table 2-1 shows the correct settings for each nominal line voltage.

Table 2-1. Line Voltage Settings

Nominal Line Voltage	Voltage Setting
100	100
120	120
220, 230	220
240	240

5. Pull out the fuse holders and check that the line fuses are the correct rating for the selected voltage (see Table 2-2). If the fuses are correct, reinstall the fuse holders and proceed to the next step. If the fuses are incorrect, proceed to the next procedure, "Changing the Line Fuses."
6. Close the line module door. Check again that the correct voltage setting for your area appears in the window.

Table 2-2. Line Fuse Ratings for Voltage Settings

Voltage Settings	Line Fuse Required
100, 120	2.5 A, 250 V, 3AG style time delay fuse (HP part number 2110-0015)
220, 240	1.6 A, 250 V, 5 x 20 mm time delay fuse (HP part number 2110-0773)

Changing the Line Fuses

The cardiograph uses two line fuses. Table 2-2 lists the fuse rating requirements for the line voltages. The correct fuse must be installed in the cardiograph before you turn it on. Fuse rating requirements are also printed on the product rating label on the back of the cardiograph.

1. Unplug the power cord from the line module.
2. Open the line module door with a small bit screwdriver.
3. Pull out the fuse holders and check that the line fuses are the correct rating for the selected voltage. Refer to Table 2-2. If you need to install line fuses with a different rating, you will also need different fuse holders. Fuses for lower voltages require fuse holder part number 2110-0686; fuses for higher voltages require fuse holder part number 2110-0687.
4. Place the fuses in the fuse holders and push each fuse holder back into the line module. Make sure that the arrows on the fuse holders point in the same direction as the arrows on the line module door.
5. Close the line module door.

Installing the Battery

This procedure describes installing the battery for the first time. If you are replacing a battery, refer to the battery replacement procedure in Chapter 7, "Removal and Replacement."

Note

The cardiograph is primarily a battery-powered instrument. It will not operate without the battery, even if it is plugged into AC power.

Use only HP battery assembly M1721A.

Warning

The battery is relatively heavy for its size. Support the battery from underneath as you install it to prevent it slipping and possibly causing injury.

To install the battery:

1. Open the cardiograph's battery compartment by loosening the two thumbscrews on the back of the cardiograph (as shown in Figure 2-6), and pulling the battery holder out.

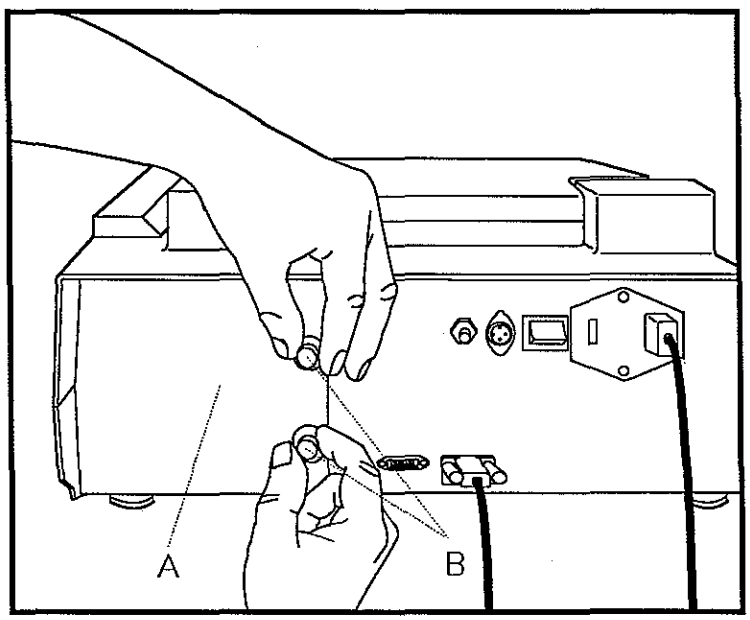


Figure 2-6. Installing the Battery.

A. Battery door
B. Thumbscrews

Note

Figure 2-6 shows the M1700A; other models are similar.

2. Install the battery on the battery holder. Make sure the tab on the door fits into the slot on the battery (refer to Figure 2-7).

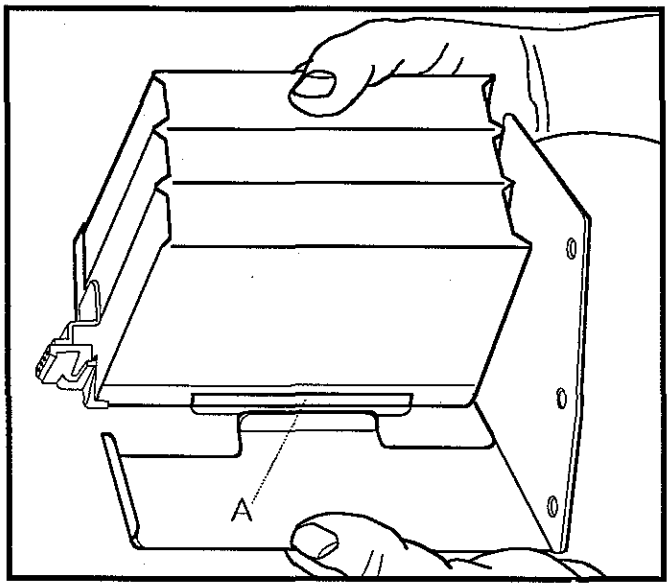


Figure 2-7. Fitting the Battery Holder Tab into the Battery Slot.

A. Battery slot

3. Gently slide the battery and holder into the battery compartment until completely seated.
4. Finger-tighten the thumbscrews on the battery holder.
5. Connect the power cord to the cardiograph, then plug the cord into an AC outlet.
6. Turn on the AC switch on the back of the cardiograph. The green AC indicator on the front panel should light up.
7. Press the On-Standby switch to turn on the cardiograph. The cardiograph will begin its power-on sequence. The M1700A and M1701A cardiographs will briefly display `PageWriter XLi` or `PageWriter XLs` in the keyboard display, then display the code 6503 (this code indicates that the software is not yet installed and there is no System disk in the disk drive). At the same time, all of the control panel indicators will light up, including the red low-battery indicator and the green charge indicators. The M1702A cardiograph will display a line of asterisks for about two minutes as it loads software from its built-in ROM. During this time, it may prompt for language and line frequency.
8. Press On-Standby again to place the cardiograph in **Standby. When the cardiograph is in Standby, it is not operational, but it is powered.**

Note

To ensure full battery capacity, charge the battery for 24 hours following its installation in the cardiograph.

Caution

If the cardiograph will be stored for longer than one month, remove the battery from the unit.

Installing the Software on the M1700 & M1701A

The software for the M1700 is provided on two disks and the software for the M1701A is provided on one disk. The software is loaded into memory when the disk is in the drive when the cardiograph is turned on.

To install the software:

1. Press the On-Standby switch to place the cardiograph in **Standby**.
2. Insert the appropriate system disk in the disk drive.
   - If you have no other applications to install, install the A.03.00 system disk (M1700-17920).
   - If you want to install M1754A SAECG software later, install the A.03.00 system disk (M1700-17920).
   - If you want to install M1790A VCG software later, install the A.03.10 option disk (M1700-17921).
   - If you have an M1701 PageWriter XLs cardiograph, install the M1701 system disk (M1701-17900).
3. Press On-Standby to turn the cardiograph **On.**
   - If no software is installed in the cardiograph, the cardiograph will begin immediately to load the software from the disk.
   - If software is already installed in the cardiograph, the prompt `Load configuration:` followed by the name of the configuration disk appears on the display.

Note

If you do not want to load the configuration shown, remove the disk and place the cardiograph in **Standby**. Find the correct disk and restart this procedure at step 2.

4. Choose a language and power line frequency when prompted.

Note

If you load the software from a configuration disk, the language and line frequency prompts will not appear because these selections are part of the stored configuration. See "Configuration Files," later in this chapter.

5. When the software installation is complete, the main menu appears on the display. Remove the disk and store it in a cool, dry, dust-free location, away from magnetic fields.
6. Check the battery level and AC indicator lights. The AC indicator and one or more of the green battery level indicators should be lit. The red "low battery" indicator should be off, though if the battery is low the green indicators will be off and the red indicator will be on.

Note

The battery level indicators function only after software is installed. To verify battery capacity, turn on the unit while the cardiograph is connected to AC power and the AC switch is on. The cardiograph must be connected to AC power when verifying battery capacity.

Once the software is installed, it does not need to be reinstalled unless the cardiograph loses battery power or has a system failure, or if you want to load upgraded or custom-configured software.

Installing the Software on the M1702A

The software for the M1702A is stored in ROM and loaded into memory automatically when the cardiograph is turned on for the first time, or after the battery has been replaced. This process takes about two minutes. During this time, you will be prompted for language and line frequency.

Loading the Paper

The cardiograph uses continuous-feed thermal paper, HP part number M1707A (A size) or M1709A (A4 size). To load the paper:

1. Release the printer door latch on the left side of the cardiograph and slide the printer door to the left.
2. Remove the paper from its packaging but do not remove or discard the cardboard backing.
3. Slide the paper stack (cardboard down) into the compartment. The paper should feed grid-side up over the top panel of the printer door.
4. Pull the free end of the paper back to the far end (latch end) of the top panel (see Figure 2-8).
5. Slide the printer door back into place making sure that it latches.
6. Press [Page Advance] to advance the paper to the beginning of the next page.

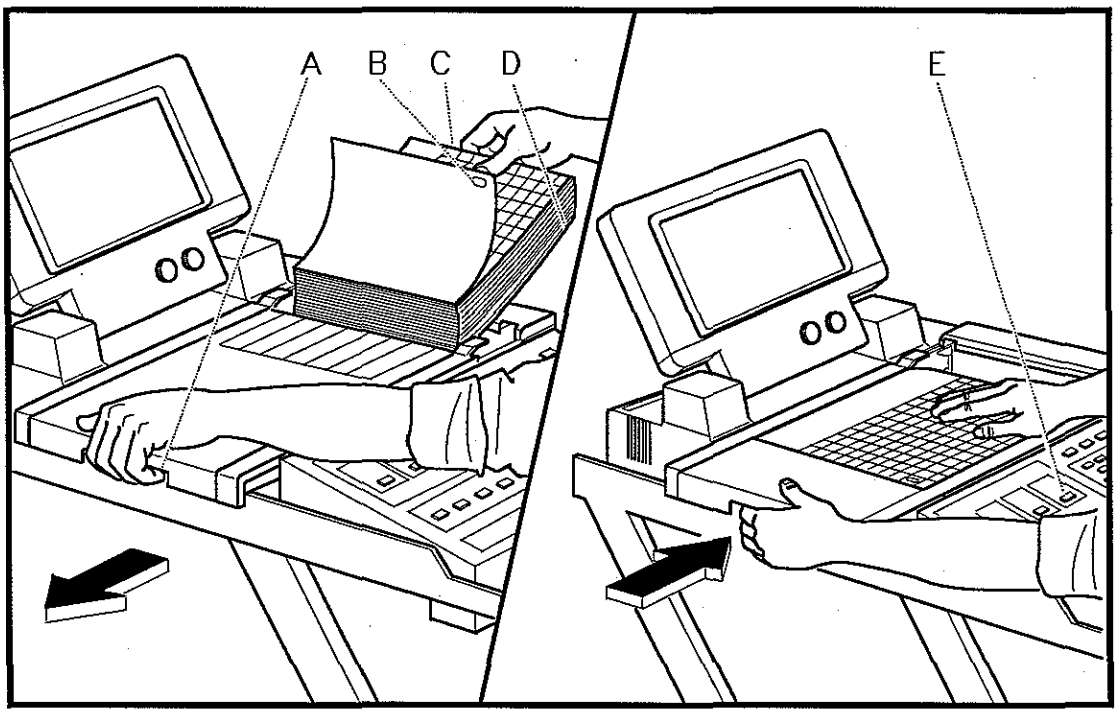


Figure 2-8. Loading the Paper.

A. Paper Door Latch

B. Paper Sensing Hole

C. Paper

D. Cardboard Backing

E. Page Advance Key

Setting the Date and Time

The main menu, shown here, allows you to set the date and the time.

```
 Auto   3x4,3R  I,II,III
Report  Format   Leads    04/01/1990   02:23:34PM
```

Note

The date format, date separators, time format, and time separators are global configuration parameters. Changing the global configuration is explained later in this chapter.

To set the date, press the softkey directly below the date. The date change display appears:

```
Date? 04/01/1990 (MM/DD/YYYY)
  Enter                Clear                Exit
```

To set the time, press the softkey below the time. The time change display appears:

```
Time? 02:23:34 PM (HH:MM:SS)
  Enter      AM/PM      Clear                Exit
```

`Enter` Stores an entry after checking its validity, then returns you to the main menu.

`AM/PM` Appears only for the time change display and only when the cardiograph is configured for the AM/PM time format.

`Clear` Clears erroneous entries and returns the currently stored date or time to the display.

`Exit` Same as `Enter`.

When the change display appears, the cursor highlights the first (leftmost) digit of the date or time. To change the date or time, simply type in the new numbers. For example, to change the time to 03:45:12 PM, simply type the digits 034512. The system automatically inserts the separators in the proper places. To change a single digit, use the left and right arrow keys, ◀ and ▶, to move the cursor over the digit you want to change. Then type the new digit. When you are satisfied the new date or time is correct, press `Enter` or `Exit` to store it as the cardiograph's current date or time.

Configuration

The cardiograph is designed to provide custom operation. The configuration parameters allow you to program the cardiograph for the most useful and efficient operation. Typically the cardiograph is configured only during initial installation.

Note

Software revision A.02.00 (M1755A) allows you to select either XLi, Preview Plus, or SAECG as the default configuration. Set the **Power on application** global parameter to the application you want the cardiograph to start up in.

This section describes the menu structure that enables you to configure the cardiograph's operating parameters. Each menu choice is described briefly in a list, then in more detail in the narrative section that follows the list.

Configuring the M1700A and M1701A

Press (Menu) until the following display appears:

```
Transmit    Store    Config    CheckDisk    Files
```

Note

The `Transmit` key appears only on the M1700A. Only the M1700A has transmission capability.

Press the `Config` softkey to display the main configuration menu:

```
                Configuration
Global      ID      Transmit      Files      Exit
```

Note

If this is not the initial configuration, you must type in the cardiograph's password (if one has been set) before you can make any changes to the configuration.

The softkeys function as follows:

Global	Allows you to set the operating parameters of the cardiograph. The Global configuration affects all cardiograph operations.
ID	Allows you to choose which patient identification entries are requested before recording an ECG.
Transmit	Allows you to set the communication parameters for transmitting and receiving ECGs. This key appears only on the M1700A because only the M1700A has ECG transmission capability.
Files	Allows you to store a configured copy of the cardiograph software to disk, or to print the configuration settings.
Exit	Returns you to the previous menu.

Note

When you make extensive changes to the system configuration, it is recommended that you print the configuration and save it on disk (the procedure for storing the system configuration is described under "Configuration Files" later in this chapter). If the software is lost due to loss of battery power, or if different configurations are used regularly on the same cardiograph, restoring a custom configuration is much quicker and easier from disk than by manually entering the changes.

Configuring the M1702A

Press Menu until the following display appears:

```
                Configuration
Global      ID                  Print      Exit
```

Global	Provides access to the cardiograph's operating parameters. Refer to Chapter 2.
ID	Provides access to the cardiograph's operating parameters. Refer to Chapter 2.
Print	Prints the cardiograph configuration.
Exit	Returns to the main menu.

Note

You cannot save the M1702A configuration. You should print the M1702's configuration, so that you can restore it if the battery is removed, or if changes are made to the configuration.

Selecting Configuration Parameters

When you select or change configuration parameters, the method is generally the same whether you are selecting Global, Transmit, or ID parameters. The display will be similar to:

```
Initial Interpretation? Reasons
  Enter     Choose                          Exit
```

In this chapter, this type of display is referred to as the parameter selection display. The message line on top displays the parameter and its current setting. The softkey labels are displayed on the bottom line.

`Enter`	Accepts the current setting, then advances to the next parameter in the list; or returns to the menu if pressed when the last parameter in the list is displayed.
`Choose`	Advances through the list of choices for the specified parameter.
`Tab`	Appears only for the "Custom" parameters in the Global list. Used to select the leads for the custom format. Moves an underscore cursor to the lead to be changed, then `Choose` is used to advance through the list of choices.
`Leads`	Used to select rhythm leads in "Default Auto?" parameter in global configuration.
`Previous`	Returns to the previous parameter (does not appear when the first parameter is displayed).
`Exit`	Returns to the menu.

Global Configuration

Pressing Global (from the configuration menu) brings up the parameter selection display. The first parameter in the Global list appears. Table 2-3 lists each Global parameter and its setting choices. The factory default settings are shown in **boldface** type. There are explanations following the table for those parameters that cannot be adequately explained in the table's Comments column.

Table 2-3. Global Configuration Parameters

Parameter	Setting Choices	Comments
Initial Interpretation? †	**Reasons** None Measure Interpret Severity only††	See "Interpretation Parameters" section following this table.
Copy Interpretation? †	**Reasons** Extend Measure None Severity only†† Choice Measure Interpret	See explanations following this table.
AutoStore?#	**Yes** No	Determines whether an Auto ECG is automatically stored without operator intervention.
Patient ID required?	**Yes** No	Appears only if AutoStore is "No." Determines whether the cardiograph will require patient ID information before recording an Auto ECG. If AutoStore is "Yes," this parameter is "Yes."

Table 2-3. Global Configuration Parameters (continued)

Parameter	Setting Choices	Comments
Auto Frequency Response?	**.15-150 Hz** .05-150 Hz .5-150 Hz W .15-40 Hz .5-40 Hz W .05-100 Hz .15-100 Hz .5-100 Hz W	W = Baseline Wander filter. See *PageWriter XLi Physician's Guide* for more information.
Manual Frequency Response?	**.05-40 Hz** .5-100 Hz W .05-100 Hz .5-150 Hz W .05-150 Hz .5-40 Hz W	W = Baseline Wander filter. See *PageWriter XLi Physician's Guide* for more information.
Line Power Filter?	**Off** On	A software filter that removes power line (AC) interference.
Line Power Frequency?	60 Hz 50 Hz	No default—selected during software installation.
Filter Key?	**BaselineWander & Artifact** BaselineWander Artifact	Determines which filter combinations are active when Filter key is on.
Auto print speed?	**25 mm/sec** 50 mm/sec	Default Auto ECG print speed; can be overridden from the front panel.
Default Auto?	**3×4** 3×4,1R I 3×4,3R I, II, III 6×2	Default format for Auto ECGs. Determines row & column notation for ECG. Rhythm strip leads also selected here ("R" means rhythm strip).
Default Manual?	**3** 6 12	Default format for Manual ECGs. Selects number of leads on Manual ECG.

Table 2-3. Global Configuration Parameters (continued)

Parameter	Setting Choices	Comments
Leads?	**AHA** IEC	Selects between two lead standards. Affects lead labels on report.
Custom 3 lead group?	**I aVF V2**	You can set any combination of the available leads for routine usage. See explanations following this table.
Custom Manual 6?	**II aVF V1 V2 V4 V6**	You can set any combination of the available leads for routine usage. See explanations following this table.
Units of Measure?	**English (lbs/ins)** Metric (kg/cm)	Used for height and weight entry. Determines Patient ID units on the ECG.
Print Interpretation? †	**Reasons** Extend Measure None Severity only†† Choice Measure Interpret	See "Interpretation Parameters" section following this table.
Time format?	**AM/PM** 24 Hr	
Time separator?	**HH:MM:SS** HH.MM.SS	
Date format?	**MM/DD/YYYY** DD/MM/YYYY YYYY/MM/DD	
Date separator?	**MM/DD/YYYY** MM.DD.YYYY MM-DD-YYYY MM DD YYYY	
Decimal format?	**XXX,XXX.XX** XXX.XXX,XX	
Paper size?	**A (8.5 × 11 in)** A4 (210 × 297 mm)	Selects between "A" (8.5×11 in) and metric "A4" (210×297 mm).
Auto Print?	**Yes** No	Allows or suppresses printing of Auto ECGs (A.02.XX and higher software only).
AutoCopy?	**No** Yes	See explanation following this table.

Table 2-3. Global Configuration Parameters (continued)

Parameter	Setting Choices	Comments
Copies? (1-5)	Type number between 1 and 5.	If AutoCopy is "Yes," selects number of automatic copies after original recording.
Location code?	Type a 5-character code.	See explanations following this table.
Cart ID?	Type a 4-character code.	See explanations following this table.
Institution Name?	Type name (up to 40 characters).	See explanations following this table.
Confirmation †	**PRELIMINARY - MD MUST REVIEW.** Type a label up to 30 characters.	
User A label?	Type a label, up to 8 characters.	See explanations following this table.
User B label?	Type a label, up to 8 characters.	See explanations following this table.
Battery timeout?	Type minutes between 3 and 999.	See explanations following this table.
Set keyboard?	**lower** UPPER	
Special applications?	**No** Yes	Allows configuration of research leads, ECG storage mode, and lead system. See the *PageWriter XLi Physician's Guide* for more information.
Research leads? *	**No** Yes	Allows 4 additional unipolar leads of user's choice.
Default Adult Criteria? *†	**08** P4	08 is the adult analysis criteria; P4 is the pediatric analysis criteria.
Default Pediatric Criteria? *†	**P4** 08	
ID criteria version entry? *#	**No** Yes	Yes causes "Criteria Version?" prompt to appear during patient ID entry. Allows use of criteria residing on ECG Management System.
Default ID criteria version?#	User-defined - 2 characters.	Appears only if "ID criteria version entry?" is yes.
ECG storage mode?# *	**Standard** (250 samples/sec) Special (500 samples/sec)	Special allows ECGs to be measured and interpreted on an M1700A.
Lead system? *	**Standard** Cabrera	If available.
Power-on application?	**XLi** Prev+ SAECG	Allows your cardiograph to start up in the selected application (appears with A.02.XX and higher software only).
Password?	User-defined (up to 8 characters).	

* This parameter appears only if "Special Applications" is set to "yes."

† This parameter appears only on the M1700A cardiograph.

This parameter does not appear on the M1702A cardiograph.

†† This parameter appears on A.03.XX software only.

Interpretation Parameters

These parameters determine the amount of information included in an Auto ECG report.

- **Initial Interpretation** controls the information that appears on the ECG when it is first taken.
- **Copy Interpretation** controls the information that appears on subsequent copies of the ECG.
- **Print Interpretation** controls the information that appears on a printout of a stored ECG.

Each setting choice adds another piece of information to the printed ECG. The settings' definitions are:

None	Prints waveform and patient ID.
Severity only	(A.03.XX only) Prints waveform, ID, and severity.
Measure	Prints waveform, ID, and measurements summary.
Interpret	Prints waveform, ID, measurements summary, and computer-generated interpretation.
Reasons	Prints waveform, ID, measurements summary, computer-generated interpretation, and interpretive reason statements.
Extend Measure	Prints a tabular summary of all measurements performed on ECG data. An alternative report.
Choice	Allows you to select the level of information included when an ECG is copied or printed from disk without having to change the overall instrument configuration.

Power-on Application (M1755A A.02.XX and Higher Software Only)

To select which application (XLi, Preview Plus, or SAECG) the PageWriter will start up with, set the "Power on application" parameter to that application.

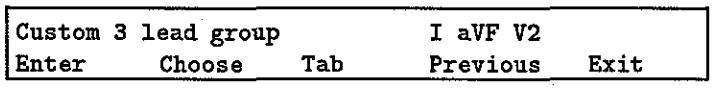
Line Frequency

This parameter selects the frequency of the filter enabled by the line power filter. The user usually selects the frequency in response to a prompt from the system during initial installation. However, the system will not prompt for a frequency selection when a custom configuration is loaded. Including this parameter in Global configuration allows the user to change the frequency selection after initial software installation.

Custom Lead Groups

Besides the pre-defined lead groups, you can configure one group of three leads and one group of six leads that may be selected for Auto 3×4,3R, Manual 3 or Manual 6 reports. These lead groups will appear and be recorded when you select Custom 3-lead group and Manual 6-lead reports from the main display.

1. Configure custom lead groups from global configuration when the display as shown below appears.



2. Press Choose to change the lead from I.
3. Use Tab to move to the next lead field. In this case, the next lead field is aVF.
4. Press Choose in each field to change the lead setting.
5. Press Enter to save the selections.

AutoCopy

When AutoCopy is set to Yes, the cardiograph automatically prints one or more copies (depending on "Copies" parameter setting) of the Auto ECG after the original is recorded. When AutoCopy is set to No, you must press (Copy) to receive an additional printed copy.

ECG Management Parameters

These parameters trigger processing protocols on the ECG management system, and provide information for ECG tracking. These parameters include:

Location code	A user-defined numeric code limited to five digits. The first three digits represent the institution and the last two characters represent the department. It can be used to identify the origin of the ECG, such as ER, ICU, CCU, or the department number.
Cart ID	A user-defined code limited to four digits. Identifies the cardiograph to the ECG management system.
Institution Name	Identifies the institution, such as "Sharon General Hospital." Limited to 40 characters.
Confirmation	A label that appears on ECGs. Can be the default label (see table) or user-defined, such as "MD signature X_____." Limited to 30 characters. Available only on the M1700A.
User A label User B label	Enter user-defined label such as "Smoker?" or "Apnea?" that appears in ID entry process. Limited to eight characters.

Battery Timeout

To lengthen battery life, the cardiograph turns off after the period of time specified by this parameter. The time is measured in minutes from the completion of the last operation, the last key press, or disconnection of patient leads. The time-out function is disabled when the cardiograph is plugged into AC and the AC switch is on.

Password

To protect your configuration settings from casual changes, you can require password entry to access the configuration. This password is set in Global configuration.

Caution

If the password is set and forgotten, you will be unable to change the cardiograph configuration without reinstalling the factory software.

ID Configuration

When you press ID from the configuration menu a parameter selection display appears. The following list presents each ID configuration option. You choose either **Yes** to include or **No** to exclude that item from the patient ID information prompted for while entering patient ID. **Yes** is the default choice for all except the last three items.

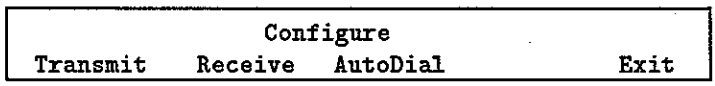
- Allow NAME entry?
- Allow AGE entry?
- Allow SEX entry?
- Allow HEIGHT entry?
- Allow WEIGHT entry?
- Allow BP entry?
- Allow RACE entry?
- Allow DX entry?
- Allow RX entry?
- Allow OPERATOR entry?
- Allow DEPARTMENT entry?
- Allow ROOM entry?
- Allow REQUESTED BY entry?
- Allow USER A entry? ("USER A" is replaced by the label defined in global configuration.)
- Allow USER B entry? ("USER B" is replaced by the label defined in global configuration.)
- Allow STAT ECG entry? (Instructs ECG Management System to process this ECG first. M1700A only.)

Transmit Configuration

When you press Transmit, the "Configure" menu for transmit appears in the display.

Note

The transmit information in this section applies only to the M1700A cardiograph.

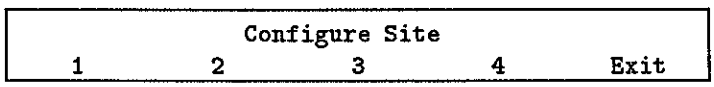


The following list briefly describes the function of each menu selection. A detailed discussion of each selection follows the list.

Transmit	Use this key to configure the cardiograph for four transmission sites.
Receive	Use this key to select the receive connection type and its baud rate.
AutoDial	Use this key to select a site to which the cardiograph automatically sends an ECG when you transmit.
Exit	Returns you to the previous menu.

Transmit

The Transmit key brings the Configure Site menu to the display:



When you select a site number, a parameter selection display appears. Table 2-4 lists each parameter and the settings available. The default setting for each parameter is shown in **boldface** type.

Table 2-4. Site Transmission Configuration

Parameter	Setting Choices	Comments
Connection?	**None** Direct Programmable Modem Hardware Modem Fax programmable modem LaserJet	 Hard wire connection to receiver. The Hayes® M1706A modem. Not supported. A.02.XX and higher software only. A.03.XX software only.
Baud Rate?	9600 19200 300 1200 2400	Defaults: 9600 for Direct, 2400 for Programmable Modem and Fax Programmable Modem, 1200 for Hardware Modem, and 19200 for LaserJet. This parameter does not appear if you select **None** as the connection type.
Phone number? *	(Blank field)	Type phone number, 36 characters max. See explanation following this table.
Dial Type? *	**Tone** Pulse	Tone is for audio tone dialing, pulse is for rotary dial system.
Pause Length? Seconds *	**2**, 4, 6, 8, 10 (secs)	See explanation following this table.
Print grid on report?†	**Yes** No	A.03.XX software only

* This parameter appears only when the Programmable Modem is selected as the connection type.

† This parameter appears only when Fax Programmable Modem or LaserJet is selected as connection type.

Entering the Phone Number. When you advance to the phone number parameter, the `Phone number?` prompt appears on the display followed by an underscore cursor. Two additional softkey labels, `Pause(,)` and `Tone(W)`, also appear. To enter the phone number, type the numerals on the keyboard. The number will appear on the display at the "Phone number?" prompt. The phone number is limited to 36 characters, including tone and pause characters.

The `Pause(,)` softkey inserts pauses (which appear as commas in the display) into the dialing sequence. The pause avoids dialing errors that can occur if the number is sent too rapidly. An example would be 1,234,567,8900. The length of the pause is selected with the pause length parameter.

The `Tone(W)` softkey inserts a tone wait (which appears as a `W` in the display) into the dialing sequence. The `W` in the number instructs the modem to wait for a dial tone before completing the dialing sequence. For example, 9W1,234,567,8900 instructs the modem to dial the 9 (for an outside line), then wait for a dial tone before it dials the rest of the number.

If you want to change one of the characters, use the left and right arrow keys, ◀ and ▶, to move the cursor to the digit you want to change, and type the new number. The new character will replace the old one. Or you can use the backspace key to erase back to the character you want to change, then retype the erased part with any changes you want to make.

Receive

When you select `Receive`, the parameter selection display appears. The following table lists each parameter and the settings available. The default setting for each parameter is shown in **boldface** type.

Table 2-5. Site Receive Configuration

Parameter	Setting Choices	Comments
Connection?	**None**	
	Direct	Hard wire connection to receiver.
	Programmable Modem	The Hayes® M1706A modem.
	Hardware Modem	Not supported.
	Fax/programmable modem	A.02.XX and higher software only.
Baud Rate?	9600	Defaults: 9600 for Direct, 2400 for Programmable Modem and Fax/programmable modem, 1200 for Hardware Modem. This parameter does not appear if you select "None" as the connection type.
	19200	
	300	
	1200	
	2400	

AutoDial

When you select `AutoDial` from the "Configure" menu, the `AutoDial site?` prompt appears in the display. Use the `Choose` softkey to select the site (`1`, `2`, `3`, `4`, or `None`) that the cardiograph will automatically dial when the operator issues a transmit command.

LaserJet Printer Configuration (A.03.XX Software Only)

The following table lists the settings to choose to configure the cardiograph to print on a LaserJet printer.

Note

Only ECGs (not SAECGs, VCGs, Store log reports, or configuration reports) can be printed on a LaserJet printer. Only PCL5 LaserJet printers are able to print from a cardiograph.

Table 2-6. LaserJet Printer Configuration

Parameter	Setting Choice
Connection?	LaserJet
Baud Rate?	19200
Print grid on report?	Yes

Configuration Files

When you press `Files` (from the main Configuration menu) the following menu appears on the display:

```
Configuration file jobs
Store          Print          Exit
```

`Store` Stores the configured software on disk.

`Print` Prints a copy of the cardiograph configuration.

`Exit` Returns you to the main configuration menu.

Note

Store the configured software each time it is changed. Print a copy of the cardiograph configuration and keep it with the configuration disk. If the software is lost due to loss of battery power, you will be able to easily restore the cardiograph to its latest configuration.

Note

The M1702A can only **print** its configuration.

Store

Storing the configured software creates a disk that contains the software, language option, and (on the M1700A only) criteria version as well as the configuration. The disk can then be loaded at power-on to initialize the cardiograph with a known configuration.

When you press `Store`, the prompt "`Enter disk label?`" appears followed by a blank field. This label, which is optional, can be up to 16 characters long, and is displayed during installation of the software. Examples of labels are "11/90 Config." or "Dr. Jones Disk."

After you type in the name and press Enter, the prompt "`Insert disk, then press Continue.`" appears. When you do so, the cardiograph displays "`Storing cardiograph configuration ...` " until the storage is complete. Then "`Disk (your label) created.`" is displayed. Press `Exit` to get back to the main configuration menu.

Note

With the A.02.XX and higher software and SAECG application installed and configured, both software configurations can be stored on a single flexible disk. This disk can then be used to re-install the A.02.XX or A.03.XX software and SAECG application together.

Note

With the A.03.XX software and VCG application installed and configured, both software configurations can be stored on a single flexible disk. This disk can then be used to re-install the A.03.XX software and VCG application together.

Print

When you press `Print` the cardiograph prints a copy of its configuration settings. The message `Printing cardiograph configuration ...` appears on the display until the printout is complete; then you return to the "Configuration file jobs" menu.